WHAT IS CLAIMED IS: 12-03-2001

1. A fast mechanical shutter for selectively (i) intercepting and deflecting, and (ii) permitting the passage of, high-power radiant emissions, comprising:

a bi-directional actuator having an output member which is rapidly movable between a first position and a second position by respective first and second shaped current signals applied to the actuator;

a radiant energy reflector that is carried by the output member, which, in the second position of the output member, resides out of the path of, and permits the passage of, the radiant emissions, and which in the first position of the armature, intercepts and reflects the radiant emissions;

a radiant emissions absorber positioned to receive the radiant emissions reflected from the reflector in its first position;

circuitry for applying a selected shaped current signal to the actuator to move the reflector to a selected position;

first sensing facilities for monitoring the actual position of the reflector and for producing a first error signal if the selected position and the actual position do not match;

second sensing facilities for measuring the temperature of the actuator and for producing a second error signal if the temperature exceeds a predetermined limit; and

first facilities for producing a fault signal in response to receipt of an error signal from the first and second sensing facilities.

2. A shutter as in Claim 1, wherein:

the actuator is a rotary actuator and the output member is rotatably movable thereby.

3. A shutter as in Claim 2, wherein:

the actuator is a rotary solenoid.

4. A shutter as in Claim 2, wherein:

the actuator is a multiphase AC motor.

5. A shutter as in Claim 2, wherein:

the actuator is a brushless DC motor.

6. A shutter as in Claim 1, which further comprises

second facilities responsive to receipt of a fault signal for effecting operation of the current signal-applying circuit to move the reflector to its second position if it is not presently thereat.

rule 126 7.

~~11.~~ A shutter as in Claim 1, wherein:

when the reflector is in its first or second position, the current signal-applying circuit applies a holding current to the solenoid so that absent the applying means applying a second or first shaped pulse to the solenoid, the reflector remains in its extant position.

rule 126 8

~~12.~~ A fast mechanical shutter for selectively (i) intercepting and deflecting, and (ii) permitting the passage of, high-power radiant emissions, comprising:

a rotary bi-directional actuator having a rotatable output member which is rapidly rotatable between a first position and a second position by respective first and second shaped current signals applied to the actuator;

a radiant energy reflector that is carried by the output member, which, in the second position of the output member, resides out of the path of, and permits the passage of, the radiant emissions, and which in other than the second position of the armature, partially or wholly intercepts and reflects the radiant emissions;

a radiant emissions absorber positioned to receive the radiant emissions reflected from the reflector;

circuitry for applying a selected shaped current signal to the actuator to move the reflector to a selected position;

first sensing facilities for monitoring the actual position of the reflector and for producing a first error signal if the selected position and the actual position do not match;

second sensing facilities for measuring the temperature of the actuator and for producing a second error signal if the temperature exceeds a predetermined limit; and

first facilities for producing a fault signal in response to receipt of an error signal from the first and second sensing facilities.

cw 126 9

~~13.~~ An actuator for moving a mechanical shutter between a first position, whereat the shutter blocks the passage of a beam of radiant energy, and a second position, whereat the shutter permits the passage of the beam, which comprises:

an electrically operable bi-directional actuator, an output member of which is selectively movable into a first position or a second position for carrying the shutter into its first or second positions; and

a circuit for selectively, positively forcing and driving the armature into either of its positions, whereat the armature remains unless and until the armature is positively forced and driven into its other position.

rule 126 10 ~~14.~~ An actuator as in Claim 13, wherein:

the circuit produces a first shaped current signal, which rapidly moves the shutter into its first position if it is not presently thereat and holds the shutter in its first position if it is presently thereat, and a second shaped current signal, which rapidly moves the shutter into its second position if it is not presently thereat, and holds the shutter in its second position if it is presently thereat.

rule 126 11 ~~15.~~ An actuator as in Claim 14, which further comprises:

facilities for selectively shaping and determining the start time and duration of, the current signals to selectively set when the shutter begins to move from one position to the other, the velocities at which the shutter moves, the acceleration and deceleration of the shutter, and the position of the shutter during its movement.

rule 126 12 ~~16.~~ An actuator as in Claim 15, wherein:

the shutter is normally in its first position; and the circuit produces in rapid order the second shaped current signal and the first shaped current signal, the shaping facilities determining the time between the start of the second current signal and the end of the first current signal, such time being the length of time the shutter permits the radiant energy to pass.

rule 126 13 ~~17.~~ An actuator as in Claim 16, wherein:

during a first portion of the shutter movement from one position to the other, the shutter is accelerated to a predetermined maximum velocity, then held at that maximum velocity for a predetermined length of time, then decelerated at a predetermined rate, then stopped and held at the other position.

rule 126 14 ~~18.~~ An actuator as in Claim 17, wherein:

the shutter is a dielectric member which is an efficient reflector at the wavelength of the radiant energy; and

in the first position of the shutter, the radiant energy is blocked and is reflected by the shutter away from the path taken to reach the shutter

rule 126 15 ~~19.~~ An actuator as in Claim 18, wherein:

the reflector is a planar member which is not coplanar or parallel with the plane of its rotation by the armature, which plane of rotation is generally normal to the path of the radiant energy, so that in its first position, the reflector intercepts the radiant energy beam and reflects the beam angularly away from the path thereof.

rule 16
126 ~~20.~~ An actuator as in Claim 18, wherein the reflector is a planar member which is not coplanar or parallel with the plane of its rotation by the armature, which plane of rotation is generally normal to the path of the radiant energy, so that in its first position, the reflector intercepts the radiant energy beam and reflects the beam angularly away from the path thereof

rule 17
126 ~~21.~~ An actuator as in Claim 18, wherein:

the reflector is a non-planar member, the type and degree of non-planarity and the plane of rotation of the output member being selected so that in its first position, the reflector intercepts the path of the radiant energy and reflects it angularly away from the path thereof.

rule 18
126 ~~22.~~ An actuator as in Claim 21, wherein:

the reflector is convex.

rule 19
126 ~~23.~~ An actuator as in Claim 18, which further includes:

an efficient absorber at the wavelength of the radiant energy, the absorber being positioned relative to the reflector in the first position thereof so that the reflector directs the reflected beam onto the absorber.

24. An actuator as in Claim 23, which further includes:

a general purpose computer capable of generating outputs representative of various shaped current signals; and means for coupling the computer to the determining and shaping facilities for controlling the shape and duration of the current signals applied to the actuator.

25. An actuator as in Claim 24, wherein:

the computer generates the outputs in response to either a stored program or the real time manipulation of the computer by a human operator